

PHILIPS



VHF-UHF TV Modulator

PM 5524

9449 055 240..

9499 490 05311

1/0371/1/01



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PHILIPS



operating manual

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I Introduction

The PHILIPS PM 5524 is an all-solid-state television VHF-UHF modulator supplying a modulated vision carrier in the TV bands I, III, IV, V and the vision IF. It is primarily designed for use in conjunction with the PHILIP PM 5522, video colour test generator and the PHILIPS PM 5520, monochrome test generator. The instrument has four built-in varicap oscillators, one for every TV band and a crystal controlled oscillator for IF, all supplying a double side band spectrum.

GENERAL INFORMATION

These oscillators can be preset to any frequency in its respective band by means of screw driver control on the frontplate.

Besides, sound information can be added by means of a switchable 5.5 MHz oscillator, which can be FM modulated either internal with 1 kHz or external.

A special feature is the possibility of a remote control of all switching functions, simplifying greatly the use and the lay-out of the test set-up.

II Technical data

Properties expressed in numerical values with stated tolerances are guaranteed by us. Numerical values without tolerances represent the properties of an average instrument.

A. Frequency ranges

Band I	: 45 – 65 MHz (alternative 53 – 83 MHz)
Band III	: 170 – 230 MHz
Band IV	: 470 – 650 MHz
Band V	: 600 – 960 MHz
IF	: 38.9 MHz (X-tal controlled)

B. Video part

Video input A	: 1 V _{p-p} ±6 dB, input impedance 75 Ω
Video input B	: 1 V _{p-p} ±6 dB, input impedance 75 Ω
Frequency response	: 50 Hz – 5 MHz ±0.5 dB
Rejection filter (switchable)	: 5.5 MHz, –20 dB
Group delay (switchable)	
frequency	pre-correction
1 MHz	: 50 nsec. ± 25 nsec.
2 MHz	: 90 nsec. ± 25 nsec.
3.75 MHz	: 0 nsec. ± 25 nsec.
4.43 MHz	: –170 nsec. ± 50 nsec.

C. Sound part

Internal modulation	: 1 kHz
Deviation	: 15 – 50 kHz
External modulation	: 1 V _{rms} , adjustable from +0 to –20 dB (screwdriver control, frontplate) input impedance 600 Ω
Deviation	: 0 – 50 kHz
Frequency range	: 50 Hz – 15 kHz
Pre-emphasis	: 50 sec.
Distortion	: < 1.5 % at 50 kHz deviation < 0.5 % at 15 kHz deviation

D. RF output

Spectrum	: double side band
Sound-video spacing	: 5.5 MHz
Sound-video power ratio	: 1:10
Output voltage	: > 100 mV _{rms} (included sync)
Attenuator	: max. > -40 dB, continuous
Output impedance	: 75 Ω
Differential gain	: < 5 %
Differential phase	: < 3 %
} 10 % – 80 % carrier level	

E. Temperature range

Operating conditions	: 0 to +50 °C
Storage conditions	: -30 to +70 °C

F. Power supply

Mains voltage	: 115/230 V ±20 %
Mains frequency	: 48 – 65 Hz
Power consumption	: 20 W at 230 V
Fuse	: For 115 V range: 400 mA, delayed action For 230 V range: 200 mA, delayed action

G. Mechanical data

Width	: 3/6 module in PHILIPS universal 19" system
Height	: 132 mm (3 units)
Depth	: 435 mm
Weight	: 8 kg (without cabinet)

H. Remote control

In operation when the multiplug is attached.
All front panel switch functions are programmable.
Double line control for presetting in the TV bands and
single line control for the other functions.
Operational by contact closure to ground or a logical
circuit.
The levels are

: -1.7 V < LOW < 2.5 V
5.5 V < HIGH < 16 V

III Accessories

With the instrument are supplied:

- 1 Operating manual
- 1 Mains flex
- 4 BNC connectors
- 2 Extension boards, enabling measurements in the instrument when it is in operation.

N.B.

The PM 5524 is delivered without cabinet.

A 3/6 module cabinet can be ordered with typenumber PM 9713.

A 19" cabinet, in which the PM 5524 fits together with the PM 5522, can be ordered with typenumber PM 9716.

IV Description of the blockdiagram

Push buttons

To obtain the remote programming facility (the multi-plug BU5 at the rear) all switching functions are D.C. controlled electronic switches.

These switching circuits, being symbolized in the block diagram as a box with a switch, are specially adapted to the PIT Logical System (PLS). (See chapter VIII "Operating the PM 5524").

Sound part

When the switch SK15 "SOUND MODULATION EXT." is pressed the external sound signals, supplied to BU2 "AF IN", are applied to the input amplifier via the potentiometer R10 "SOUND".

From the input amplifier, which supplies the signal with a 50 μ sec pre-emphasis, the sound signal is applied to the "5.5 MHz Sound modulator".

When the switch SK13 "SOUND MODULATION INT." is pressed the external sound signal will be substituted by a signal from the "1000 Hz oscillator".

The "5.5 MHz Sound modulator" is a oscillator, which can be FM modulated by the applied AF signal (frequency sweep ± 50 kHz).

The 5.5 MHz sound signal is added in the "Adder" stage to the video signal.

Video part

The generator is supplied with 2 input channels: BU3 "VIDEO A" and BU4 "VIDEO B".

The input signal can be selected by means of the switches SK9 "VIDEO INPUT A" or SK10 "VIDEO INPUT B", controlling the input amplifiers.

The gain of the amplifiers can be adjusted by R8 "VIDEO A" respectively R9 "VIDEO B".

When the switch SK11 "FILTER" is released the video signal is applied directly to the "d.c. restore".

But when SK11 "FILTER" is pressed the video signal is applied via the "EQUALIZER and 5.5 MHz notch filter" to the "d.c. restore".

This filter introduces the specified phase pre-distortion and suppresses possible signals on 5.5 MHz.

The "d.c. restore" is clamping the sync top to a fixed d.c. level by means of the line pulses obtained from the "Sync separator".

In the adder stage the video signal is added to the 5.5 MHz sound signal.

RF oscillators and modulator

The "Modulator", which is supplied with the video signal with 5.5 MHz sound and a RF signal, is supplying a double side band signal to the output connector BU1 "RF OUT".

The oscillator for the IF frequency is X-tal controlled.

The oscillators, which cover respectively bands I, III, IV and V are frequency controlled by varicap diodes.

The voltages of the diodes are adjusted by the potentiometers R2 — R7 in unit 6.

The "Frequency meter", which is also supplied with the voltage of the potentiometers, is calibrated to the frequency obtained from the RF oscillators.

The oscillators and the potentiometers are switched on by the switches SK2 — SK7.

The switches are controlling the oscillators via a matrix system.

The "Matrix" can be wired in accordance with local wishes (see chapter VII-C).

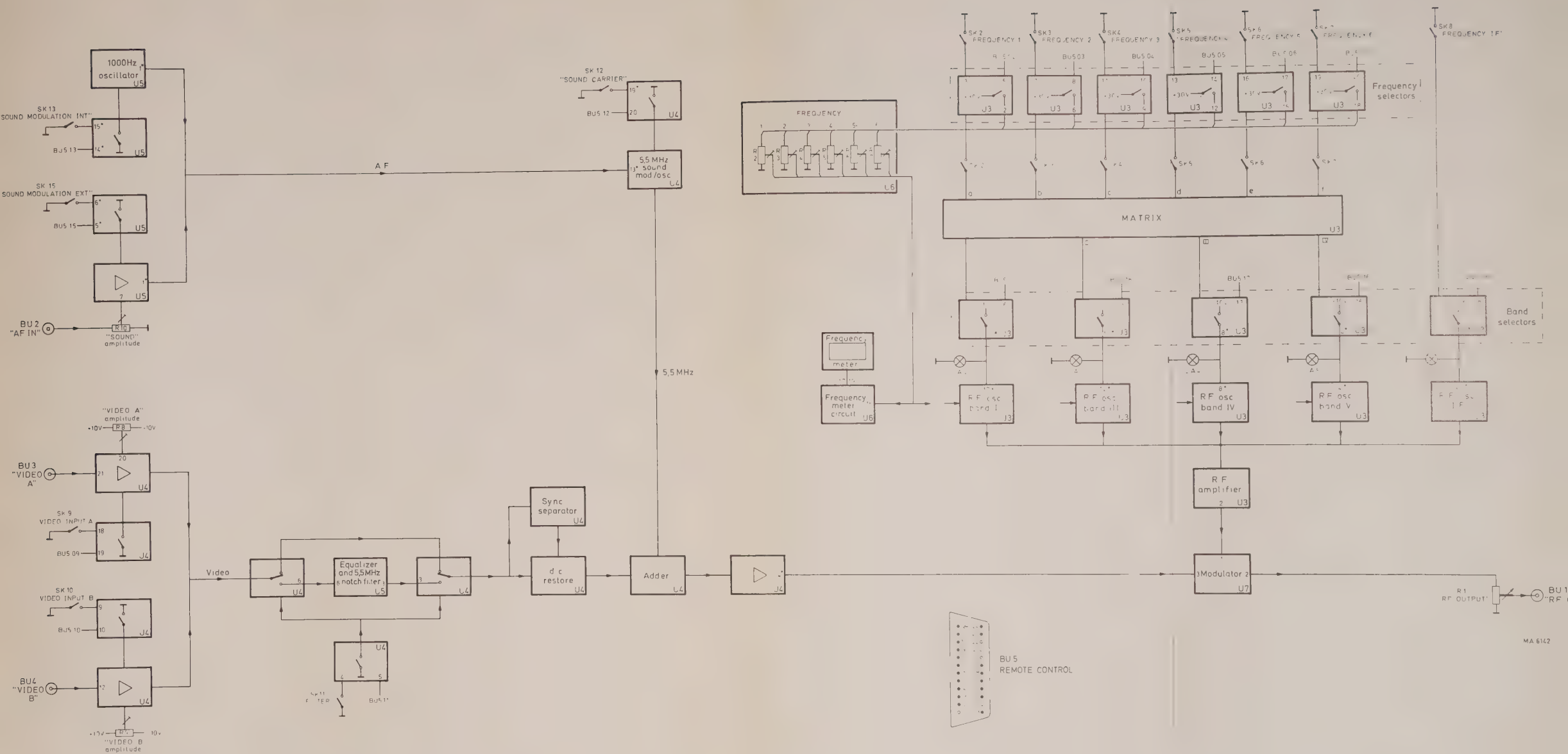


Fig. IV-1. Block diagram

V Installation

OPERATING INSTRUCTIONS

A. Adjusting to the local mains voltage

The instrument can be used with mains voltages of 115 V and 230 V, $\pm 20\%$.

Before installation check the adjustment.

If the instrument has to be adjusted to another mains voltage resolder the connections to the primary windings of the mains transformer as shown in the figure below.



Fig. V-1. Adjusting to the local mains voltage

B. Earthing

Earth the instrument according to the local safety regulations.

The instrument can be earthed via BU6 or via the earthing core of the mains flex.

N.B.

To avoid destroying of the semi-conductions in the modulator, interconnect the chassis of the TV set with the common of the PM 5524, while the TV set is connected to the mains via an isolating transformer.

C. Mounting in a cabinet

The instrument can be mounted in a 3/6 module cabinet PM 9713.

The PM 5524 fits, together with PM 5522, in a 19" cabinet.

The mounting instructions are delivered with the cabinets.

VI Survey of controls and sockets

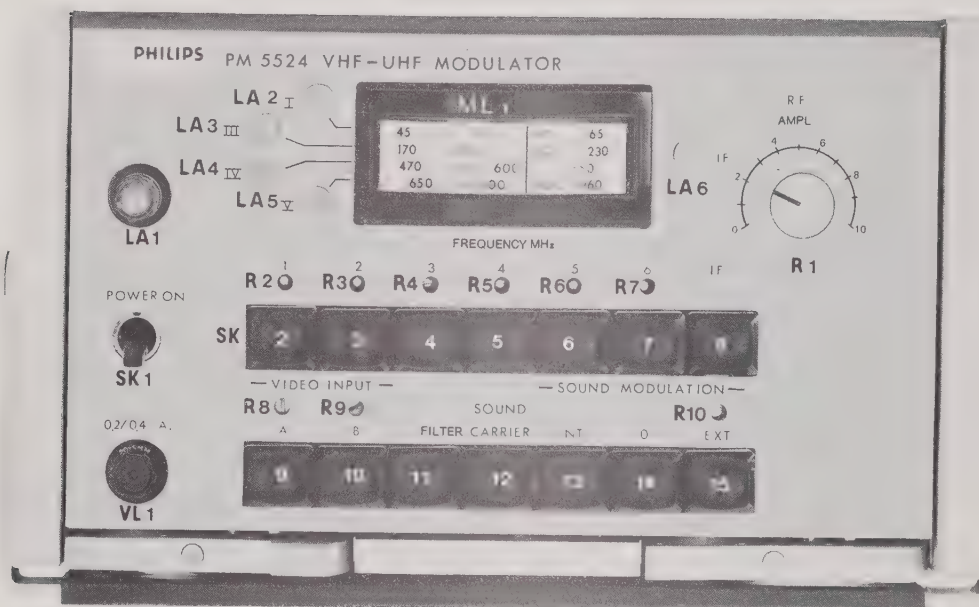


Fig. VI-1. Front of the instrument

A. Front of the instrument

LA1	Pilot lamp: lights up when the instrument is switched on.	SK2 – SK7	TV band selectors: each push button selects a TV band.
LA2, LA3	TV band indicator: lights up when the respective TV band is in operation.		At delivery: SK2, SK3 → band V
LA4, LA5			SK4 → band IV
			SK5 → band III
			SK6, SK7 → band I
LA6	IF indicator: lights up when the vision carrier is supplied on IF basis.		This can be modified by internal resoldering.
M1	Frequency meter: indicates on which frequency the vision carrier is supplied.	SK8	IF selector: when pressed the instrument supplies the IF vision carrier.
VL1	Safety fuse: 230 V - 200 mA, delayed action type; 115 V - 400 mA, delayed action type.	SK9	"VIDEO INPUT A" When pressed the video signal applied to BU3 "VIDEO A" will be available on a RF basis at BU1 "RF OUTPUT".
SK1	"POWER ON" Mains switch: the instrument is switched on if the lever of the switch is placed upwards.	SK10	"VIDEO INPUT B" When pressed the video signal applied to BU4 "VIDEO B" will be available on a RF basis at BU1 "RF OUT".

- SK11** "FILTER"
When pressed a 5.5 MHz rejection filter plus a group delay pre-distortion filter will be switched in the video signal.
- SK12** "SOUND CARRIER"
When pressed the sound carrier is added to the vision carrier.
- SK13** "SOUND MODULATION INT."
When pressed the sound carrier is internal modulated with 1 kHz.
- SK14** "SOUND MODULATION 0".
When pressed the sound carrier will not be modulated.
- SK15** "SOUND MODULATION EXT."
When pressed the sound carrier will be modulated with an audio signal applied to BU2 "AF IN".
- R1** "RF AMPL."
continuous attenuator, controlling RF output voltage.
- R2...R7** Potentiometer for pre-setting the frequency of the vision carrier in the TV band selected by the respective push button (SK2...SK7).
- R8** Potentiometer, adjusting the applied video signal A by ± 6 dB.
- R9** Potentiometer, adjusting the applied video signal B by ± 6 dB.
- R10** Potentiometer, adjusting the applied sound signal from +0 to -20 dB.

B. Rear of the instrument

- BU1** "RF OUT - 75Ω ".
Output socket for the composite RF signal.
- BU2** "AF IN - 600Ω ".
Input socket for an external audio signal if SK15 is pressed.
- BU3** "VIDEO A - 75Ω ".
Input socket for an external video signal if SK9 is pressed.
- BU4** "VIDEO B - 75Ω ".
Input socket for an external video signal if SK10 is pressed.
- BU5** "REMOTE CONTROL".
Multiplug to facilitate a remote programming of the instrument. The modulator is switched over to remote programming when pin 23 is connected to pin 24 of the 24-pole multiplug (see chapter VII-8).
- BU6** "⏏".
Earth terminal: common earth for electrical circuits and metal cabinet.
- BU7** Mains socket.

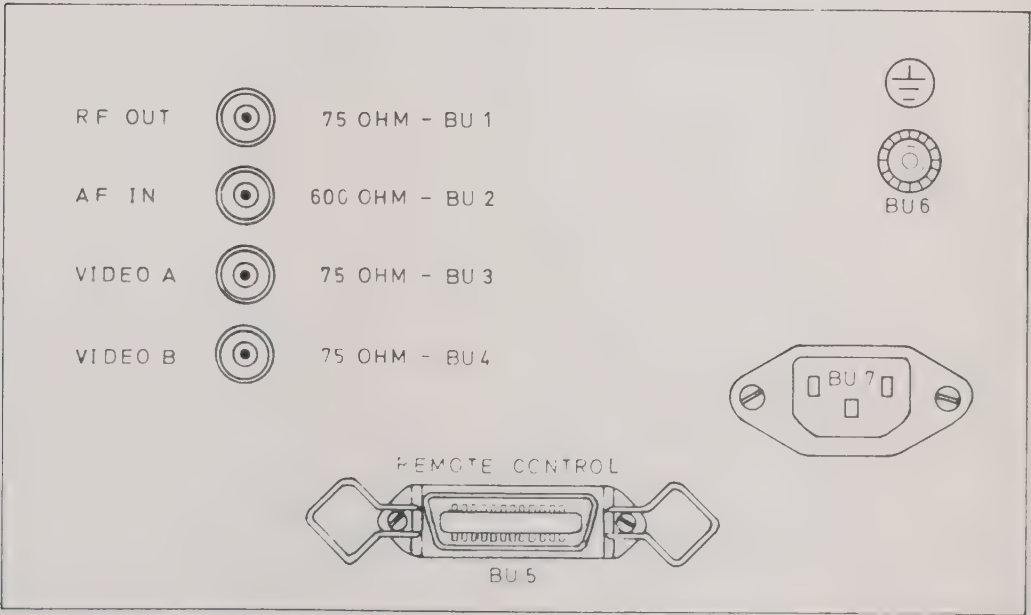


Fig. VI-2. Rear of the instrument

VII Operating the PM 5524

A. Manipulations

- Apply a video signal to BU3 and/or BU4 and select the video input by means of SK9 or SK10.
- The video signal should be 1 V_{p-p} for 100 % modulation (10 % rest carrier).
Slight differences can be adjusted by means of potentiometer R8 or R9 (frontplate).
- Select the TV band by means of the push buttons SK2...SK7 or IF by means of SK8 (respective indicator lights up).
- Preset to the required frequency by means of the respective potentiometer R2...R7.
- When a group delay pre-distortion of the video signal is required, press SK11; at the same time a 5.5 MHz rejection filter is switched in the video signal to avoid any influence between the 5.5 MHz sound carrier and 5.5 MHz harmonics in the video signal.
- A sound carrier can be added to the vision carrier by pressing SK12.
- This sound carrier can be added unmodulated (SK14), internally modulated with 1 kHz (SK13) or externally modulated with an audio signal applied to BU2 (SK15).
- Adjust the RF output voltage to the required level by means of R1 (RF AMPL).

B. Remote programming

If the instrument has to be remote-controlled connect the modulator with the remote control unit by means of the multiplug at the rear.

The "internal-remote" switch is activated by interconnecting pin 23 with pin 24 of the multiplug.

The other numbers of the pins have been matched to the several functions of the modulator.

A certain function is put in operation by connecting the corresponding pin of the multiplug to common.

However, for selecting a carrier frequency in one of the TV bands, two pins should be connected to common. Viz. on to select a TV band and the other a potentiometer, pre-setting the frequency (see Fig. VII-1).

C. Selecting a TV band

The four TV bands are selected by means of the six push buttons SK2 – SK7.

Each push button switches in one varicap oscillator and the potentiometer, situated just above the respective push button, for presetting the frequency.

Which TV band is switched in is dependent on the matrix in unit 3. (see also Fig. VII-2).

At delivery: SK2, SK3 → band V
SK4 → band IV
SK5 → band III
SK6, SK7 → band I

The matrix can easily be modified by resoldering the links.

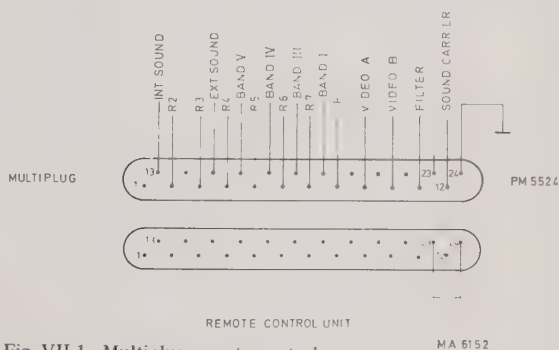


Fig. VII-1. Multiplug remote control

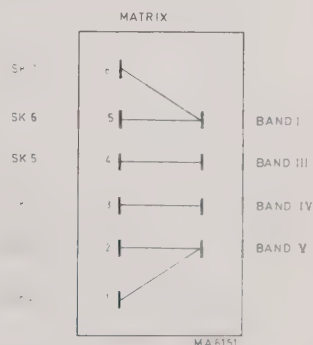


Fig. VII-2. Matrix

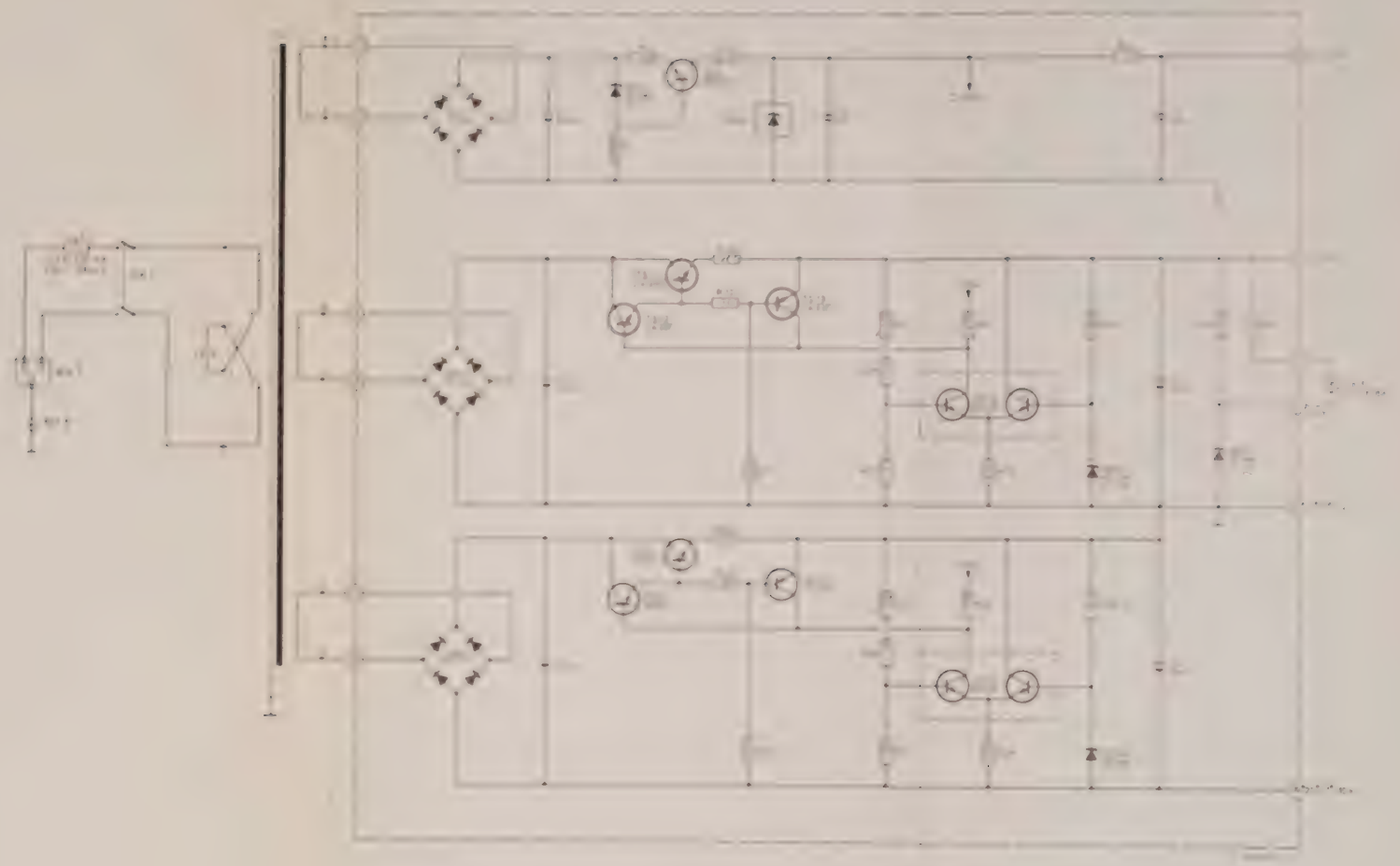


Fig. VIII-2. Circuit diagram, power supply, unit 1

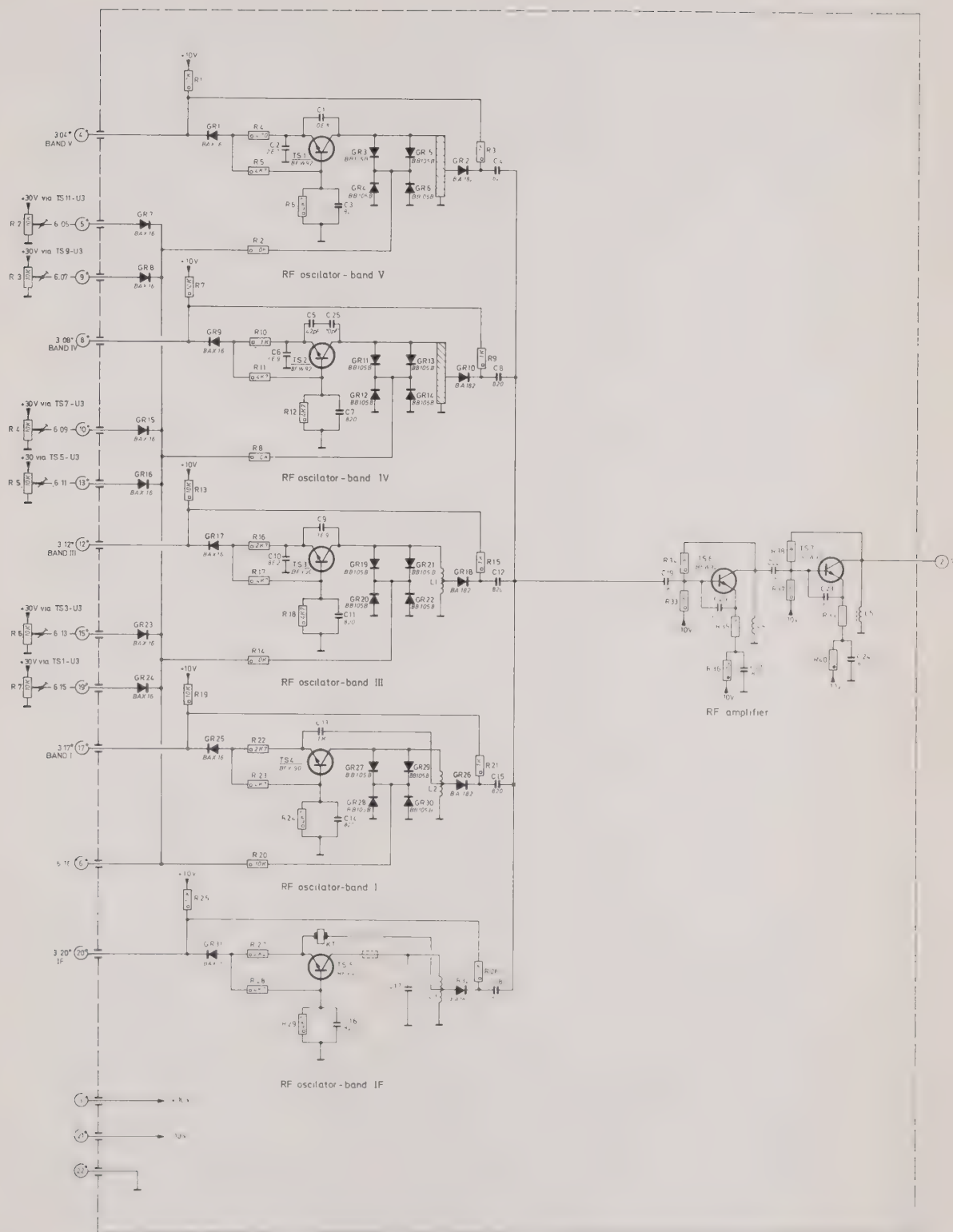


Fig. VIII-3. Circuit diagram, RF oscillator, unit 2

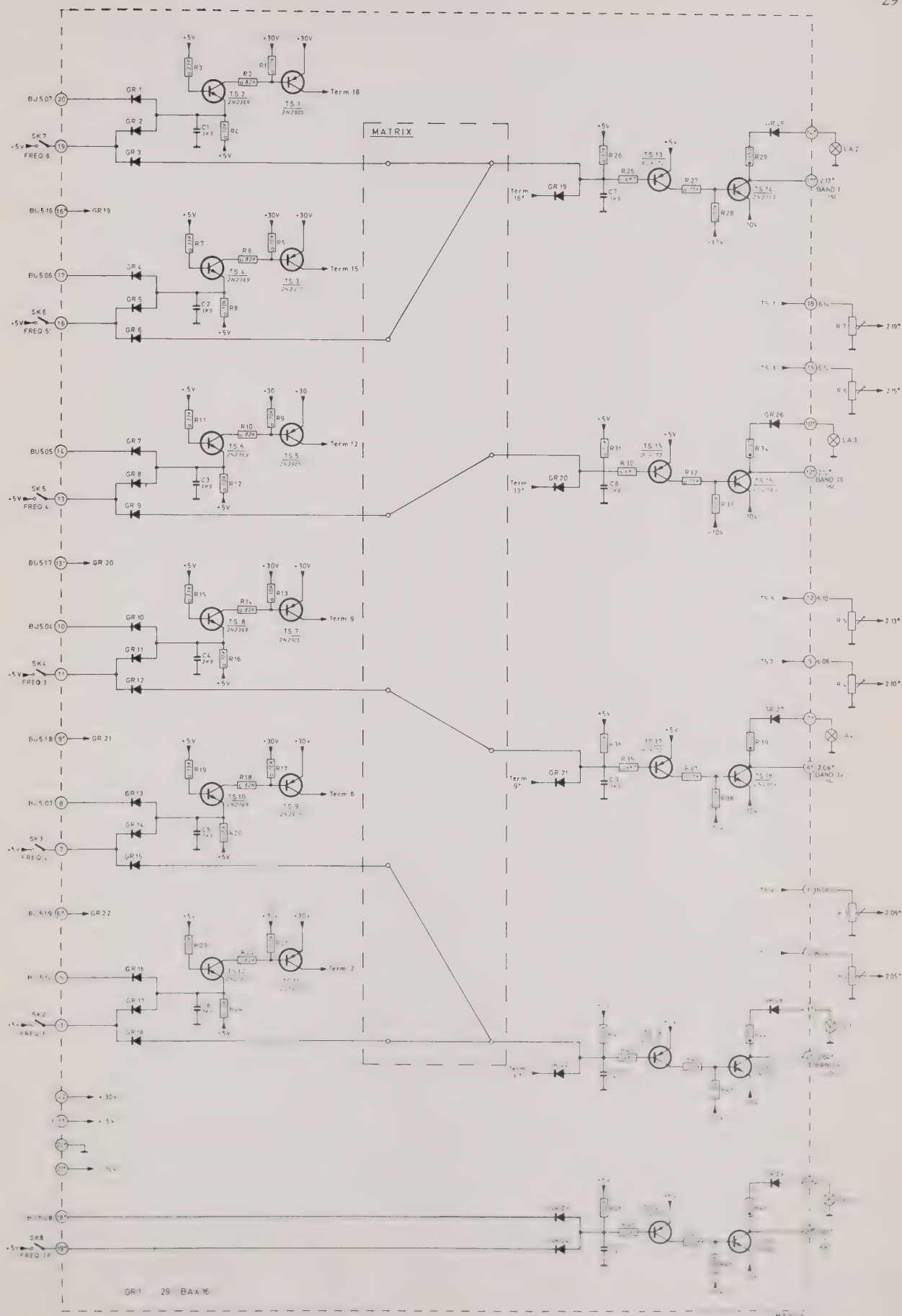
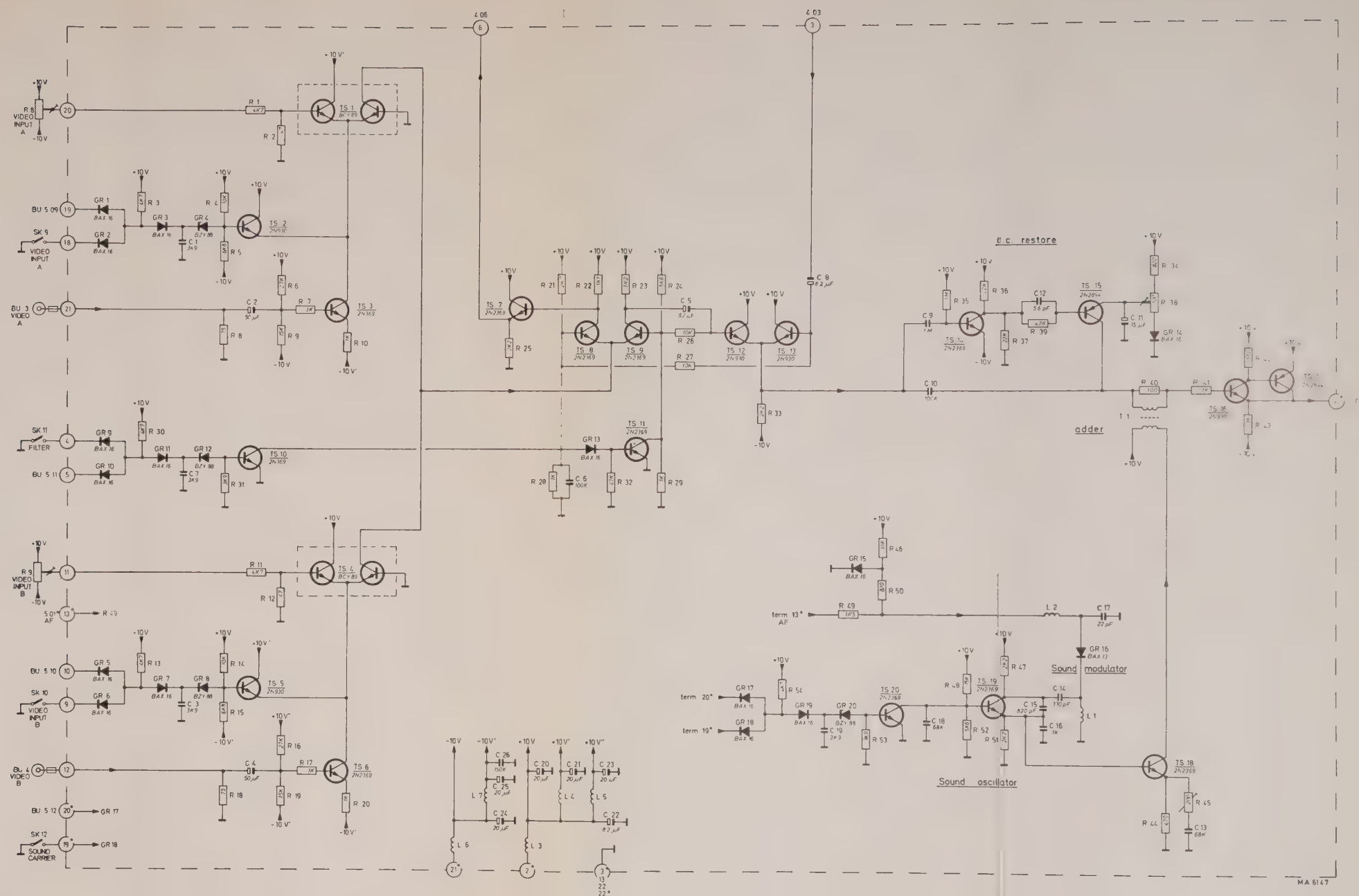


Fig. VIII-4. Circuit diagram, control gates, unit 3



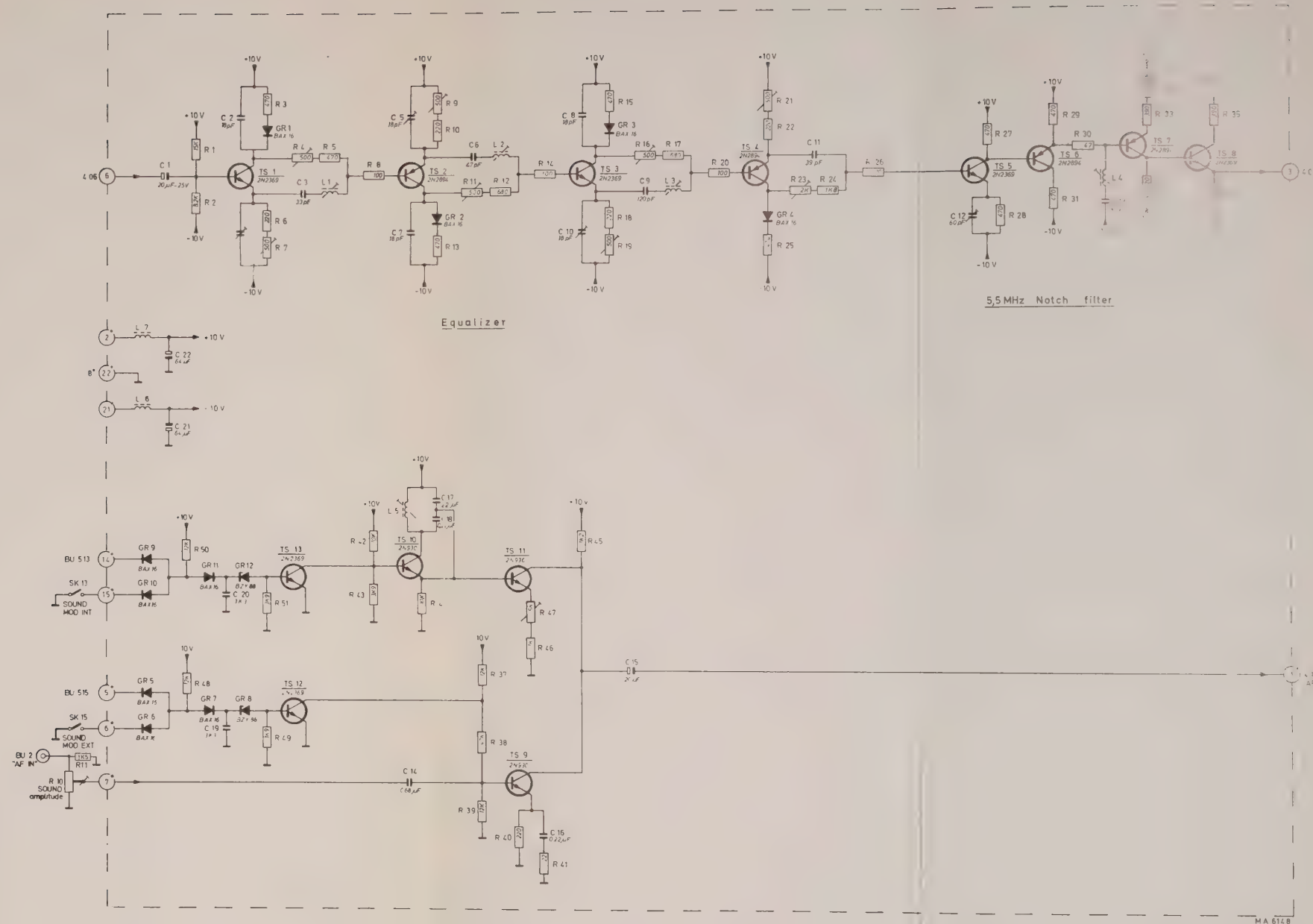


Fig. VIII-6. Circuit diagram, equalizer and sound, unit 5

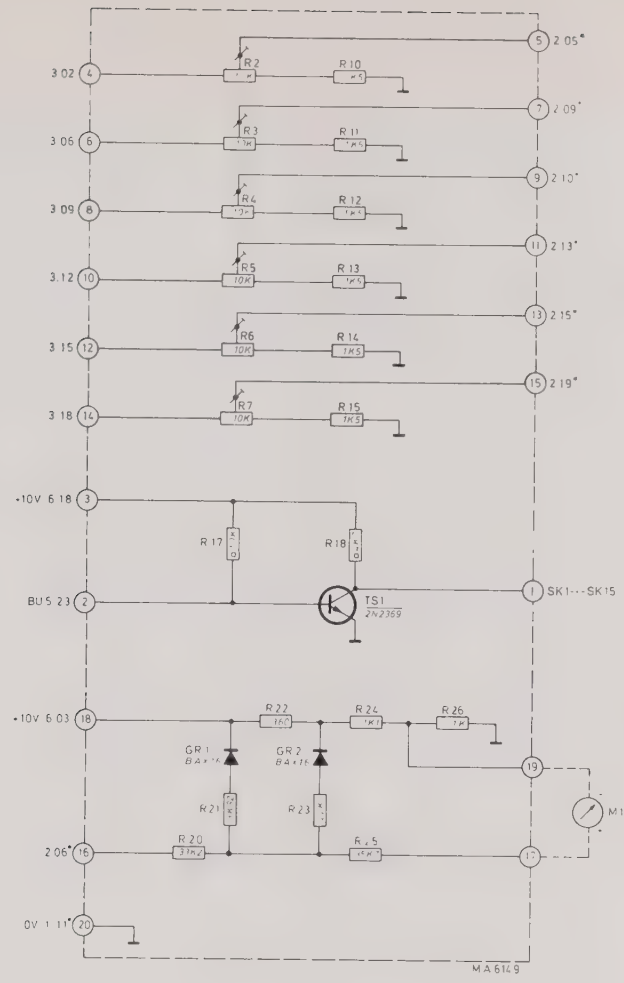


Fig. VIII-7. Circuit diagram, connection board, unit 6

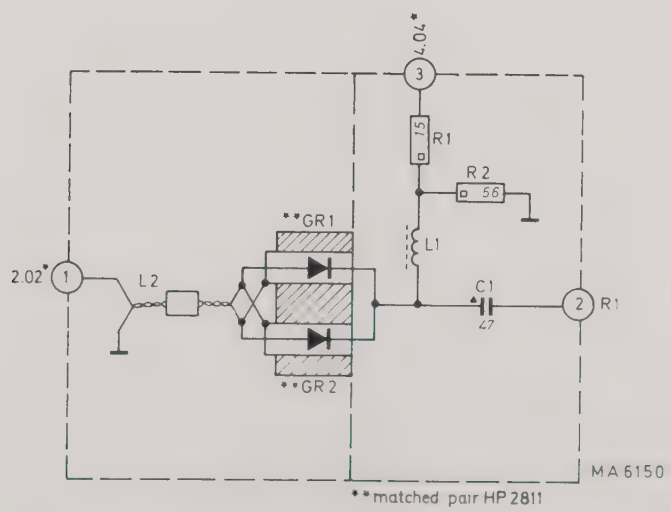


Fig. VIII-8. Circuit diagram, modulator unit, unit 7

IX List of spare parts

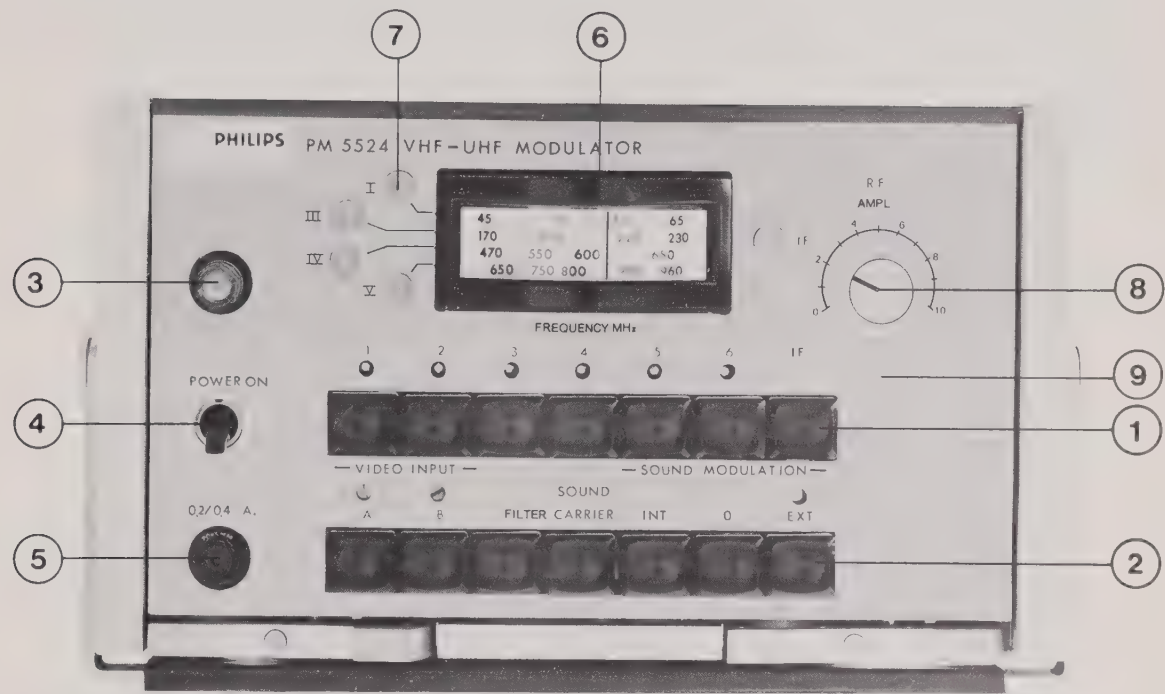


Fig. IX-1. Front view

A. Mechanical

Item	Quantity	Description	Ordering number
1	1	Push button unit	4822 276 70053
2	1	Push button unit	4822 276 70052
3	1	Control lamp holder	4822 255 10078
3	1	Pilot lamp	4822 134 40264
4	1	Mains switch	4822 277 10021
5	1	Fuse holder	4822 256 40039
5	1	Fuse 230 V/T 200 mA	4822 253 30012
5	1	Fuse 115 V/T 400 mA	4822 253 30016
6	1	Frequency meter (200 μ A)	4822 347 20075
7	5	Pilot lamp	4822 134 40265
8	1	Knob	4822 413 40211
8	1	Cap for knob	4822 413 70037
9	1	Textplate	4822 255 70107
	1	Mains flex	4822 321 10071
	1	Mains socket	4822 265 30066
	1	Earth connector	4822 290 40012
	4	BNC socket	4822 265 10003
	1	Multiplug	4822 267 60035
	8	Contact bloc	4822 267 60023
	8	Guide part	4822 462 30117
		Twin lead	4822 526 10084

B. ELECTRICAL — ELEKTRISCH — ELEKTRISCH — ELECTRIQUE — ELECTRICOS

This parts list does not contain multi-purpose and standard parts. These components are indicated in the circuit diagram by means of identification marks. The specification can be derived from the survey below.

Diese Ersatzteilliste enthält keine Universal- und Standard-Teile. Diese sind im jeweiligen Prinzipschaltbild mit Kennzeichnungen versehen. Die Spezifikation kann aus nachstehender Übersicht abgeleitet werden.

In deze stuklijst zijn geen universele en standaardonderdelen opgenomen. Deze componenten zijn in het prinsipschema met een merkteken aangegeven. De specificatie van deze merktekens is hieronder vermeld.

La présente liste ne contient pas des pièces universelles et standard. Celles-ci ont été repérées dans le schéma de principe. Leurs spécifications sont indiquées ci-dessous.

Esta lista de componentes no comprende componentes universales ni standard. Estos componentes están provistos en el esquema de principio de una marca. El significado de estas marcas se indica a continuación.

	Carbon resistor E24 series Kohleschichtwiderstand, Reihe E24 Koolweerstand E24 reeks Résistance au carbone, série E24 Resistencia de carbón, serie E24	$\left. \begin{array}{l} 0,125 \text{ W} \\ 5\% \end{array} \right\}$		Carbon resistor E12 series Kohleschichtwiderstand, Reihe E12 Koolweerstand E12 reeks Résistance au carbone, série E12 Resistencia de carbón, serie E12	$\left. \begin{array}{l} 1 \text{ W} \leq 2,2 \text{ M}\Omega, 5\% \\ > 2,2 \text{ M}\Omega, 10\% \end{array} \right\}$
	Carbon resistor E12 series Kohleschichtwiderstand, Reihe E12 Koolweerstand E12 reeks Résistance au carbone, série E12 Resistencia de carbón, serie E12	$\left. \begin{array}{l} 0,25 \text{ W} \leq 1 \text{ M}\Omega, 5\% \\ > 1 \text{ M}\Omega, 10\% \end{array} \right\}$		Carbon resistor E12 series Kohleschichtwiderstand, Reihe E12 Koolweerstand E12 reeks Résistance au carbone, série E12 Resistencia de carbón, serie E12	$\left. \begin{array}{l} 2 \text{ W} \\ 5\% \end{array} \right\}$
	Carbon resistor E24 series Kohleschichtwiderstand, Reihe E24 Koolweerstand E24 reeks Résistance au carbone, série E24 Resistencia de carbón, serie E24	$\left. \begin{array}{l} 0,5 \text{ W} \leq 5 \text{ M}\Omega, 1\% \\ > 5 \text{ M}\Omega, 2\% \\ > 10 \text{ M}\Omega, 5\% \end{array} \right\}$		Wire-wound resistor Drahtwiderstand Draadgewonden weerstand Résistance bobinée Resistencia bobinada	$\left. \begin{array}{l} 0,4 - 1,8 \text{ W} \\ 0,5\% \end{array} \right\}$
	Carbon resistor E12 series Kohleschichtwiderstand, Reihe E12 Koolweerstand E12 reeks Résistance au carbone, série E12 Resistencia de carbón, serie E12	$\left. \begin{array}{l} 0,5 \text{ W} \leq 1,5 \text{ M}\Omega, 5\% \\ > 1,5 \text{ M}\Omega, 10\% \end{array} \right\}$		Wire-wound resistor Drahtwiderstand Draadgewonden weerstand Résistance bobinée Resistencia bobinada	$\left. \begin{array}{l} 5,5 \text{ W} \leq 200 \Omega, 10\% \\ > 200 \Omega, 5\% \end{array} \right\}$
	Wire-wound resistor Drahtwiderstand Draadgewonden weerstand Résistance bobinée Resistencia bobinada	$\left. \begin{array}{l} 10 \text{ W} \\ 5\% \end{array} \right\}$			
	Tubular ceramic capacitor Rohrkondensator Keramische kondensator, buistype Condensateur céramique tubulaire Condensador cerámico tubular	$\left. \begin{array}{l} 500 \text{ V} \end{array} \right\}$		Polyester capacitor Polyesterkondensator Polyesterkondensator Condensateur au polyester Condensador polyester	$\left. \begin{array}{l} 400 \text{ V} \end{array} \right\}$
	Tubular ceramic capacitor Rohrkondensator Keramische kondensator, buistype Condensateur céramique tubulaire Condensador cerámico tubular	$\left. \begin{array}{l} 700 \text{ V} \end{array} \right\}$		Flat-foil polyester capacitor Miniatur-Polyesterkondensator (flach) Platte miniatur polyesterkondensator Condensateur au polyester, type plat Condensador polyester, tipo de placas planas	$\left. \begin{array}{l} 250 \text{ V} \end{array} \right\}$
	Ceramic capacitor, "pin-up" Keramikkondensator "Pin-up" (Perltyp) Keramische kondensator "Pin-up" type Condensateur céramique, type perle Condensador cerámico, versión "colgable"	$\left. \begin{array}{l} 500 \text{ V} \end{array} \right\}$		Paper capacitor Papierkondensator Papierkondensator Condensateur au papier Condensador de papel	$\left. \begin{array}{l} 1000 \text{ V} \end{array} \right\}$
	"Microplate" ceramic capacitor Miniatur-Scheibenkondensator "Microplate" keramische kondensator Condensateur céramique "microplate" Condensador cerámico "microplaca"	$\left. \begin{array}{l} 30 \text{ V} \end{array} \right\}$		Wire-wound trimmer Drahttrimmer Draadgewonden trimmer Trimmer à fil Trimmer bobinado	
	Mica capacitor Glimmerkondensator Micakondensator Condensateur au mica Condensador de mica	$\left. \begin{array}{l} 500 \text{ V} \end{array} \right\}$		Tubular ceramic trimmer Rohrtrimmer Buisvormige keramische trimmer Trimmer céramique tubulaire Trimmer cerámico tubular	



For multi-purpose and standard parts, please see PHILIPS' Service Catalogue.
Für die Universal- und Standard-Teile siehe den PHILIPS Service-Katalog.
Voor universele en standaardonderdelen raadplege men de PHILIPS Service Catalogus.
Pour les pièces universelles et standard veuillez consulter le Catalogue Service PHILIPS.
Para piezas universales y standard consulte el Catálogo de Servicio PHILIPS.

Printpanels

Unit	Description	Print number	Ordering number
1	Power supply	4008 108 75820	4822 216 60197
2	RF oscillator	4008 108 75830	4822 216 60198
3	Control gates	4008 108 75840	4822 216 60199
4	Video amplifier	4008 108 75850	4822 216 60201
5	Equalizer and sound	4008 108 75860	4822 216 60202
6	Connection board	4008 108 75870	4822 216 60203
7	Modulator unit	4008 108 76070	4822 216 60204
	Extension board	4008 108 75620	4822 263 70055

Semiconductors

Type	Ordering number	Type	Ordering number
BCY72	4822 130 40486	BA182	4822 130 30644
BCY89	4822 130 30188	BAX16	4822 130 30273
BFW30	4822 130 40379	BB105B	4822 130 30661
BFW92	4822 130 40745	BY164	4822 130 30441
BFY90	4822 130 40493	BZY88/C3V9	4822 130 30411
2N930	4822 130 40051	BZY88/C4V7	4822 130 30264
2N2369	4822 130 40407	BZY88/C5V1	4822 130 30284
2N2894	4822 130 40018	BZY88/C5V6	4822 130 30193
2N2905	4822 130 40021	BZY88/C6V2	4822 130 30286
2N3055	4822 130 40132	HP2811 (matched pair)	4822 130 30697

Integrated circuits

Type	Ordering number
TAA550	4822 130 40463

Diagram number	Description	Value	Watt/Volt	Ordering number
R8, R9	Potentiometer	4.7 kΩ		4822 101 20002
R10	Potentiometer	1 kΩ		4822 101 20369
Unit 1				
C1	Electrolytic capacitor	100 μF	63 V	4822 124 20389
C2	Capacitor	4.7 kpF	125 V	4822 120 11125
C3	Capacitor	1.5 μF		4822 121 40227
C11, C21	Electrolytic capacitor	1000 μF	25 V	4822 124 20419
C12, C22	Electrolytic capacitor	20 μF	25 V	4822 124 20499
R2	Resistor	909 Ω	1 %	4822 116 50765
R4	Resistor	475 Ω	1 %	4822 116 50545
R6	Resistor	20 kΩ	1 %	4822 116 50332
R9	Resistor	22 Ω		4822 110 50063
R12	Resistor	301 Ω	1 %	4822 116 50786
R13	Resistor	3001 Ω	1 %	4822 116 50524
R14, R24	Resistor	2.7Ω	1 W	4822 113 60099
R15, R25	Potentiometer	500 Ω		4822 103 10052
R16, R26	Resistor	1000 Ω	1 %	4822 116 50573
R17, R27	Resistor	1500 Ω	1 %	4822 116 50752
R18, R28	Resistor	2430 Ω	1 %	4822 116 50157
R19, R29	Resistor	825 Ω	1 %	4822 116 50764
R20	Resistor	7500 Ω	1 %	4822 116 50151
R22	Resistor	357 Ω	1 %	4822 116 50603
R23	Resistor	3320 Ω	1 %	4822 116 50404
Unit 2				
X1	Crystal	38.9 MHz		4822 242 70171
L1	Coil			4822 156 10373
L2	Coil			4822 156 10374
L3	Coil			4822 156 10375
L4, L5	Coil			4822 158 10052
C2, C20, C23	Capacitor	2.7 pF		4822 122 40064
C3, C4, C7 } C8, C11, C12 }	Capacitor	820 pF		4822 122 30112
C14, C15, C16 } C18, C21, C22 }	Capacitor	820 pF		4822 122 30112
C6, C9	Capacitor	3.9 pF		4822 122 40015
C10	Capacitor	8.2 pF		4822 122 40009
C13, C19, C22	Capacitor	1 nF		4822 122 30027
R35, R39	Resistor	14 Ω		4822 111 30373
Unit 3				
C1...C11	Capacitor	3.9 kpF		4822 122 30098
Unit 4				
T1	Transformer			4822 158 10345
L1	Coil	3.9 μH		4822 156 20591
L2	Coil			4822 158 10267
L3...L7	Coil			4822 158 10052
C1, C3	Capacitor	3.9 kpF		4822 122 30098

Diagram number	Description	Value	Watt/Volt	Ordering number
C7, C19	Capacitor	3.9 k μ F		4822 122 30098
C2, C4	Electrolytic capacitor	50 μ F	10 V	4822 124 20501
C5, C8, C22	Electrolytic capacitor	8.2 μ F	16 V	4822 124 10067
C6, C10	Capacitor	0.1 μ F		4822 121 40059
C9, C16	Capacitor	1 μ F		4822 121 40197
C11	Electrolytic capacitor	15 μ F	10 V	4822 124 10017
C12	Capacitor	5.6 pF		4822 122 30004
C13, C18	Capacitor	68 k μ F		4822 121 40057
C14	Capacitor	330 pF		4822 121 50369
C15	Capacitor	820 pF		4822 121 50368
C17	Capacitor	22 pF		4822 120 33063
C20, C21, C23 } C24, C25 }	Electrolytic capacitor	20 μ F	16 V	4822 124 20499
R8, R18	Resistor	75 Ω	1 %	4822 116 50151
R22	Resistor	1.1 k Ω	1 %	4822 116 50518
Unit 5				
L1	Coil	52 μ H		4822 156 20586
L2	Coil	70 μ H		4822 156 20587
L3	Coil	77 μ H		4822 156 20588
L4	Coil	18 μ H		4822 156 20589
L5	Coil	130 mH		4822 157 20687
L6, L7	Coil			4822 158 10052
C1	Electrolytic capacitor	20 μ F	25 V	4822 124 20499
C2, C7, C8	Capacitor	18 pF	63 V	4822 122 30014
C3	Capacitor	33 pF	63 V	4822 122 30016
C4, C5, C6	Capacitor	18 pF	500 V	4822 125 50051
C6, C13	Capacitor	47 pF	63 V	4822 122 30008
C9	Capacitor	120 pF	63 V	4822 122 30093
C11	Capacitor	39 pF	63 V	4822 122 30046
C12	Capacitor	60 pF	500 V	4822 125 50057
C14	Capacitor	680 k μ F	100 V	4822 121 40233
C15	Electrolytic capacitor	20 μ F	16 V	4822 124 20499
C17	Capacitor	2.2 μ F	100 V	4822 121 40188
C16, C18	Capacitor	0.22 μ F	100 V	4822 121 40232
C19, C20	Capacitor	3.3 k μ F		4822 122 30016
R4, R7, R9, R11 } R16, R19, R21, R32 }	Potentiometer	500 Ω		4822 100 10137
R23	Potentiometer	2 k Ω		4822 100 10126
R47	Potentiometer	10 k Ω		4822 100 10035
Unit 6				
R1...R6	Potentiometer	10 k Ω		4822 101 10024
R10...R15	Resistor	1.5 k Ω	1 %	4822 116 50752
R20	Resistor	33.2 k Ω	1 %	4822 116 50482
R21	Resistor	3.92 k Ω	1 %	4822 116 50103
R22	Resistor	357 k Ω	1 %	4822 116 50603
R23	Resistor	22.1 k Ω	1 %	4822 116 50648
R24	Resistor	1.1 k Ω	1 %	4822 116 50518
R25	Resistor	35.7 k Ω	1 %	4822 116 50927
R26	Resistor	1 k Ω	1 %	4822 116 50573

Diagram number	Description	Value	Watt/Volt	Ordering number
Unit 7				
L1	Coil	1 μ H		4822 158 10311
L2	Transmission line	50 Ω		4822 158 10344

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